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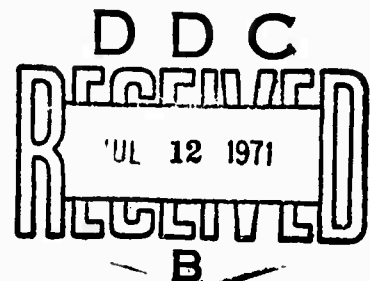
INSTRUMENTALITY THEORIES:  
CONCEPTUAL AND METHODOLOGICAL  
PROBLEMS

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Abstract

Instrumentality or expectancy theories have recently been used to predict the effort, performance and satisfaction of employees in various organizational settings. The theory states that behavior can be predicted from (1) the probability of the act leading to some outcomes multiplied by (2) the evaluation of these outcomes. Much of the research using these ideas was originally conducted in the area of decision making. This paper presents a critical analysis of the attempts to generalize these ideas from the decision making area to other areas of organizational behavior (e.g., effort and satisfaction). Special reference is made to the conceptual and methodological problems involved in the measurement of the theory's two components.

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INSTRUMENTALITY THEORIES:  
CONCEPTUAL AND METHODOLOGICAL PROBLEMS<sup>1</sup>

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The notion that man attempts to maximize his pleasure is not new. As a philosophical stance, it can be traced back to the hedonistic principles of early Greek philosophers. In psychology, one conceptualization of this idea appears in the form of instrumentality theories which postulate that an individual's behavior is a function of (1) the probability of the act leading to certain outcomes, and (2) the evaluation of those outcomes. A very simple idea. It is the purpose of this paper to point out the problems involved in the implementation and testing of this theory in the area of organizational psychology.

The instrumentality idea is rather general and has led some philosophers to call it the basic law of human behavior (Arthur Pap, 1962). It appears under a variety of names such as expectancy theory, social learning theory, decision theory, or instrumentality theory. Research that utilizes the idea has appeared in the areas of decision making (Edwards, 1961), learning theory (Rotter, 1954), verbal conditioning (Dulany, 1967), motivation (Atkinson, 1964), social power (Nagel, 1968), attitudes (Fishbein, 1967) and organizational behavior (Vroom, 1964). Table 1 shows how some of these theorists have labeled the two constructs.

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Insert Table 1 about here  
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TABLE 1  
Labels Used for Theoretical Components\*

Theorist	Determinants of Impulse to Action
Tolman	Expectancy of goal, demand for goal
Lewin	Potency X valence
Edwards	Subjective probability X utility
Atkinson	Expectancy X (motive X incentive)
Rotter	Expectancy, reinforcement value
Vroom	Expectancy X valence; where valence is (instrumentality X valence)
Peak	Instrumentality X attitude (affect)
Rosenberg	Instrumentality X importance
Dulany	Hypothesis of the distribution of the reinforcer X value of the reinforcer
Fishbein	Probability X attitude

\*This table is a modification of one presented by Lawler (1971). We will refer to these two terms as instrumentality (I) and valence (V).

Although the theory has appeared in many different areas of psychology, it has been most extensively researched in the area of decision making (see Becker and McClintock, 1967). More recently, the theory has been used to predict organizational behavior (see Mitchell and Biglan, 1971, for a review of the empirical evidence). Much of the work in the organizational area is based upon the paradigm used in the decision making research. This paradigm will be referred to throughout the paper in order to clarify the problems of using the theory to predict organizational behavior.

#### Theoretical Background: Criteria

Clearly the first decision is what behavior is to be studied. In the organizational area investigators have primarily chosen to study the degree to which an individual exerts effort on the job. The various alternatives on this continuous dimension could be conceptualized as discrete steps such as high, moderate or low effort. The individual should choose that alternative which he believes will maximize his rewards. In the areas of decision making or learning, the criteria have frequently been an actual set of discrete responses. For example, subjects might be asked to choose one of two alternatives in the prisoner's dilemma game. Our concern is not with how these criteria are measured but rather how this decision is related to problems with the measurement of the other theoretical components.

#### Theoretical Background: Predictors

The theory itself is really composed of three components which must be measured: (a) a list of outcomes or potential consequences of the individual's behavior; (b) the degree to which the individual feels that

behaving in a certain way is instrumental for the acquisition of these outcomes, and (c) an evaluation of the outcomes. The theory then states that behavior can be predicted from the sum of these evaluations times instrumentalities over a set of outcomes<sup>2</sup>. The theory can be represented as follows:

$$B = \sum_{i=1}^n I_i V_i$$

where

$B$  = behavior to be predicted

$I_i$  = the instrumentality of the behavior  
for obtaining an outcome

$V_i$  = the valence or evaluation of each outcome

$n$  = the number of outcomes.

The remainder of this paper is devoted to pointing out the various problems that occur when one attempts to measure these components. Most of the issues discussed involve decisions that must be made by the experimenter and each of these decisions has implications for how he views this theory. We are not attempting a critical evaluation and, therefore, examples are used because they illustrate a point--not because they are necessarily conceptually incorrect. Numerous hours have been spent pondering these issues and it is hoped that the paper will clarify what we believe to be major problems with the use of the theory in the area of organizational behavior.

#### Decisions about Outcomes

The first step in the research process that uses this theory is to generate a list of outcomes. Issues related to their acquisition, level of specificity and content will be discussed.

### I. Acquisition

The basic question here is whether the experimenter should generate the list of outcomes from his own intuition and knowledge of the area or whether the subjects themselves produce this list. The theory would demand that the subjects' own outcomes be used. However, this decision is partly determined by the amount of control that the investigator has over the experimental setting. In some cases the experimenter decides on the outcomes and controls them. For example, the laboratory studies in decision making (e.g. Beach & Wise, 1969) typically set up a monetary reward as the outcome that hinges on the subject's decision in some game or task. In the industrial setting where the experimenter has less control, the theory has typically been used to predict effort on the part of employees and the outcomes have been generated both by the experimenter (e.g., Porter & Lawler, 1968) and by the subjects themselves (e.g., Hackman & Porter, 1968). It makes more sense theoretically that the subject should be asked to list his own outcomes, especially in those settings where the experimenter has no control over these outcomes.

But this decision immediately presents another problem. The list of all outcomes generated by all the subjects is typically reduced to a smaller list of most frequently listed outcomes (e.g., Hackman & Porter, 1968). There is some evidence that this process does not harm our prediction extensively (Hackman & Anderson, 1968). The use of a shortened list, however, may attenuate our prediction to the extent that outcomes are missed that are important for given individuals. The alternative, that each subject get an individual questionnaire, with his own list of outcomes, requires much more time, work, and effort both on the part of the subjects and the

experimenter.

## II. Level of Specificity

Another problem related to the above is the level of specificity of the outcomes. In an organizational setting does one exert a lot of effort on the job because he wants to meet a deadline or because he feels that effort will bring him recognition? These outcomes differ in their level of specificity and it is not clear that the problem is resolved by passing along this decision to the subjects. It seems that there will be different outcomes generated depending upon the way the question is worded, especially if an example is listed. Perhaps it is the case that very specific outcomes would increase prediction, but outcome agreement would be substantially less.

In the study of organizational behavior this problem has been dealt with by distinguishing between outcome levels. Campbell, Dunnette, Lawler, & Weick (1971) suggest the model in Figure 1, where task goals refer to such things as time limits or production standards and first level outcomes as rewards contingent upon one's performance (e.g., promotion, recognition). Second level outcomes are conceptualized as rewards that satisfy more basic needs such as housing, material goods or freedom from anxiety. This revised model is both conceptually and theoretically elegant but it is also fairly cumbersome. To date there is little evidence that would support or reject the use of this particular elaboration.

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## III. Content

In situations where the experimenter either decides upon the outcomes

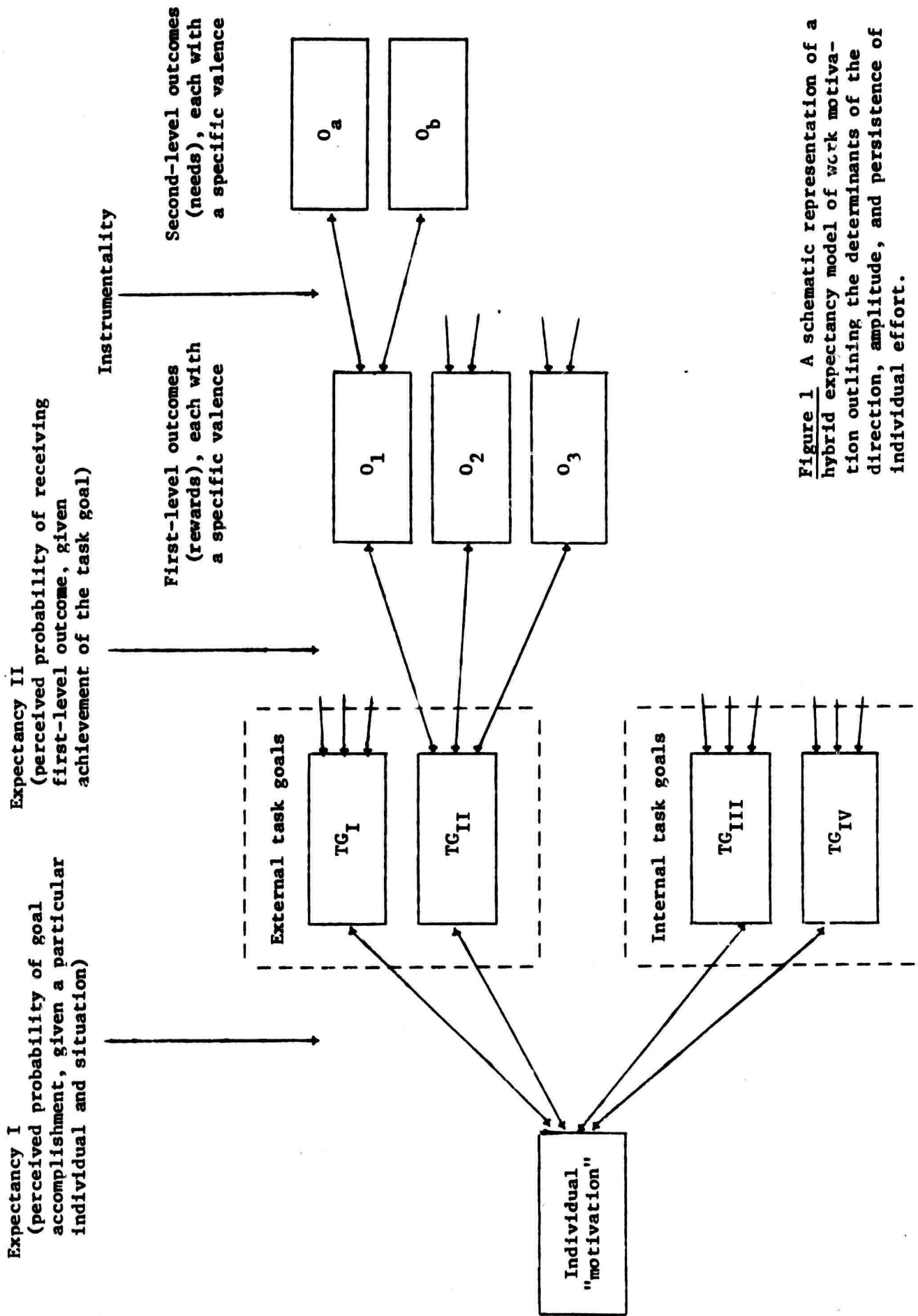


Figure 1 A schematic representation of a hybrid expectancy model of work motivation outlining the determinants of the direction, amplitude, and persistence of individual effort.

or reduces a list generated by the subjects, he must make decisions about the content of these items. It has been suggested that negative outcomes are important (Hackman & Porter, 1968), and they are therefore, introduced by the experimenter. This is done for three reasons: First, subjects usually do not list negative outcomes as consequences of their behavior. Second, it is not clear that striving for positive outcomes is completely inversely proportional to the avoidance of negative outcomes. For example, if one rated "high pay" as six on a seven point important-unimportant scale, "low pay" will not necessarily be rated as two on the same scale. Third, we can observe that negative consequences do, indeed, occur (e.g., one can be fired for not exerting enough effort).

At this point an important distinction should be made. In theory, adding new outcomes that are not perceived as such by given subjects should not detract from our prediction. If the behavior is not perceived as instrumental for the attainment of the outcome, the subject should indicate that probability as zero and the probability-valence product would also be zero. The logical consequence of this fact would suggest that one make the list of outcomes as long as he feels is necessary. In practice, however, the inclusion of these "non-relevant" outcomes decreases the predictability of the theory. Rosenberg (1965), for example, reports much better prediction of one's attitude based upon a limited set of outcomes than when the  $\Sigma IV$  was computed for all outcomes.

It appears that when the investigator does not control the outcomes that the generation of an outcome list presents an unsolvable dilemma. Letting each subject list his own outcomes (whatever level or content) is theoretically best but presents numerous practical problems. When the



investigator generates a list (either a composite from subjects' responses or one based on his own knowledge) he runs the risk of hurting his prediction with a long list or missing important outcomes with a short list. There is little evidence to date which compares these strategies for predicting organizational behavior.

### Assessment of Instrumentalities

The theory requires an assessment of the relationship between the behavior and the outcomes. Three major issues seem to be involved. One deals with the kind of mathematical relationship that is conceptualized (probabilistic vs. correlational) and the second is concerned with the frame of reference with regard to time (past, present, or future). The third problem deals with the generality of the relationship.

#### I. Mathematical Relationship

The measurement problem here is concerned with whether one treats the behavior and the outcome dimensions as continuous or discrete. It has already been discussed that the criteria used in the decision making area are usually discrete behaviors (e.g., the choice of a column in the prisoner's dilemma) and in the organizational area they are usually continuous (e.g., the amount of effort). The same issue is true for the outcomes. The decision making studies frequently have discrete payoffs (e.g., \$10 vs. \$5) while the organizational ones use whole dimensions as outcomes (e.g., recognition). Beach & Wise (1969), for example, had the subject move markers on a calibrated line which went from .00 to +1.00. This marker indicated the subjective probability that a specific outcome would occur following a specific choice. In settings where

effort is being predicted, the question may be worded in a way that implies correlation. Graen (1969), for example, asked subjects what they believed was their chance of improving performance if they really worked hard. That is, do increments in work lead to increments in performance.<sup>3</sup>

The discrete/continuous distinction for both the criterion and the outcomes suggests the four possible relationships presented in Table 2. It makes sense to talk about the probability of a specific act leading to a specific outcome and examples are listed below.

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 Insert Table 2 about here  
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The probability of extreme effort leading to high pay is .85.

The probability of receiving a certain payoff in a Prisoner Dilemma game if I choose alternative A is .5.

It also makes sense to talk about the relationship between continuous variables as correlational.

My effort is positively related to my performance.

Sleep deprivation is negatively related to performance.

However, from a theoretical point of view this latter approach has some problems to which we shall return.

The other two alternatives in Table 2 are more difficult to conceptualize. What is the relationship between extreme effort (discrete) and pay (continuous)? It is neither probabilistic or correlational. The same sort of problem exists for statements such as: What is the relationship between attendance and a \$50 raise? One is forced either to say that a certain amount of attendance is likely to result in the given

TABLE 2  
Criteria - Outcome Relationship

		Outcome	
		Discrete	Continuous
Criteria	Discrete	Probability	?
	Continuous	?	Correlation

raise or that attendance and raises are positively correlated. That is, one conceptualizes the issue as either discrete/discrete or continuous/continuous.

In the settings where the discrete/discrete relationships are present, a further theoretical distinction has been made. The investigators in the area of decision making demand that the probabilities for a given act leading to a set of outcomes sum to 1.00 (see Edwards, 1954, 1961). So, for example, if the subject has three choices, A, b, and C, and three payoffs (\$10, \$5, and \$1) the sum of probabilities that A will result in each of the three outcomes would be 1.00. This refinement is built upon the assumption that these outcomes are independent, mutually exclusive, and exhaustive. One and only one outcome must be obtained. The data supporting this model in the experimental settings provided have been generally supportive. However, this paradigm is not always an accurate description of the variables being dealt with in other settings.

In the organizational setting investigators have been forced to work with both continuous criteria and continuous outcomes. The response to this problem has been to arbitrarily impose a discrete/discrete relationship on the dimensions. Hackman and Porter (1968) ask the question this way: "If a person works especially hard on the job, she is more likely to feel a sense of completion and accomplishment at the end of the day." Here we have a point on the effort dimension being related to a level of a specific outcome. Yet, the behavior to be predicted is the amount of effort exerted on the job. Actual effort is predicted--not "especially hard" effort.

To be theoretically correct, the investigators should measure the degree to which the subject feels that each level of possible effort leads

to each level of every outcome and then predict that the level of effort selected will be the one with the highest EIV. This is impractical for a variety of reasons. First, it requires the experimenter to subjectively choose discrete steps to impose on the continuous criteria and outcome dimensions. Second, the amount of work involved for the subject multiplies tremendously with each breakdown. Five levels of effort leading to five levels of each of five outcomes would require 125 responses.

A problem with the alternative is the assumption that the score on one discrete/discrete relationship reflects what the scores should be on all the others. So, for example in the Hackman and Porter (1968) study mentioned above a subject that said working especially hard was moderately sure to lead to accomplishment and that accomplishment was highly valued would supposedly exert greater effort than one who had a lower score on either of these two dimensions (with all other effort-outcome relationships presumed to be equal). A linear relationship is being assumed. The problem with this strategy is that the first subject may feel that working only moderately hard will definitely lead to accomplishment. By collapsing the effort dimension the investigator by definition loses information and to some extent the predictability of the theory is attenuated. The problem here is with the utility of the theory--not with its correctness. Because one is forced to use a modification of the theory implies that the theory may be cumbersome but not necessarily wrong.

Attempting to use a correlational question presents similar difficulties. The question asked could be as follows:

One exerts different amounts of effort on the job and we are interested in what you feel is the relationship between your effort and your performance

evaluations.

In general, increases in effort usually

Increase \_\_\_\_\_ decrease  
strongly moderately slightly 0 slightly moderately strongly

my performance evaluations.

A similar example was used by Galbraith and Cummings (1967). The subject indicated his answer by drawing a line from performance-promotion to the point on the scale which best described his feelings<sup>4</sup>.

performance-promotion

I feel that the more I produce, the better are my chances for a promotion.

I feel that my production is important but management looks at other things too.

I don't think my chances for a promotion are affected one way or another by the amount of my production.

I feel that large amounts of production could hurt my chances for a promotion. I feel that large amounts of production would definitely hurt my chances for a promotion.

Again, this type of question implies a linear relationship which is questionable. A second possible shortcoming is that this approach implies the use of change scores which means that effort must be assessed both before and after the questionnaire data are gathered. Finally, it assumes that different subjects have the same frame of reference for "increases" in effort. We will return to this problem at the end of the paper.

In summary, the theory is meant to predict an individual's choice

among a set of alternative behaviors. The probability of each behavior leading to each outcome should be assessed. In situations where this has been possible, the empirical results show strong support for the theory. In other settings where the number of possible behaviors and outcomes is less clear, investigators have been forced to make certain questionable assumptions about linearity and to predict responses across people rather than a given act for a given individual. In general, the data supporting these latter investigations have been less impressive than those for the studies where the investigator is clearly dealing with discrete/discrete relationships. Future studies should attempt to assess the consequences of employing these assumptions.

## II. Time Dimension

Another problem in measuring instrumentalities is the time frame of reference. The criterion is sometimes measured at the same time as the expectancies and outcomes, or at some specified time in the future. It is also true that the outcomes can be referred to as something that one will get (see Graen's question above) or something that he has now. For example, Porter and Lawler (1968) ask, "How important does the organization consider effort for determining your present pay?"

It appears as if the theory refers to a future orientation. That is, both our present behavior and our estimates of our future behavior are a function of what we think it will get us; our past behavior, a function of what we thought it would get us. Most of the research in the area seems to have taken this idea into account. Dulany (1967), for example, gets both measures of response and instrumentality after the experiment. His

question is phrased correctly in that he asks whether the subject thought that the reinforcement had followed anything that he had done. An experiment by Zipf (1960) on social power deals with the probability one will obtain the goal if one conforms, and conformity is measured later. Again, one must keep the criterion, the outcomes, and their relationship within the proper context.

### III. Generality of the Relationship

A third problem is simply that the questions asked sometimes do not refer explicitly to the individual. For example, Hackman and Porter (1968) start their questions in the following manner. "If a person works especially hard on this job," (and a set of outcomes follow). However, one may perceive that some relationship exists in general, but not for his specifically. A black employee may feel that effort generally leads to promotion, but that effort was unrelated to promotion in his specific case. It is important to say again that the theory is an individual one, and if we are trying to predict a person's behavior, then the questions should examine how he perceives his behavior as leading to the outcomes.

#### Measurement of Outcomes

Two major issues seem to be important for how one assesses the valence of the outcomes. The conceptualization of the outcome can be dealt with as a continuous dimension or as a point on a dimension. The second topic will deal with some minor measurement problems.

### I. Dimensionality

It was stated earlier that in many of the decision making studies, the laboratory studies on attitudes, and the work on verbal conditioning,



there is one specific outcome or a small set of outcomes that are discrete. In the organizational settings, however, each outcome represents an underlying dimension. For example, pay, security, and sense of accomplishment all represent dimensions of outcomes, and one acquires a point on that dimension through one's effort. The problem occurs as to whether one measures the valence of the dimension as a whole, or the valence of a specific point on the dimension.

A major consideration is, of course, how the instrumentality question was asked. As discussed earlier, the theoretically correct strategy is to treat the criterion/outcome relationship as discrete/discrete. The important point is that the measurement of the outcome should refer to the same outcome that was used for the instrumentality question. To ask the subject the relationship between high pay (discrete) and good performance (discrete) and then assess the importance of performance (without the qualification "good" does not make sense.

In cases where this mismatch has occurred, or where correlational questions are used, a general assessment of the dimension as a whole has been employed. For example, Porter and Lawler (1968) ask "How important is the amount of effort you expend on the job for determining your present pay?" Both the amount of effort and pay are discrete points. However, the assessment of the outcome asks for the "importance of the characteristic" which means the pay dimension. If one measures the importance of the whole dimension, however, he is implying that high valence means that the subject wants a lot of it. This may not be the case. It may be extremely important to someone to have only a moderate amount of pay if, for example, a raise would put him in another tax bracket. Two people might indicate

that high effort was directly related to high pay (a piece-rate system) and indicate that pay as a dimension was very important. One individual might, therefore, work very hard, whereas our man with a tax problem would not.

One suggested way out of this problem is to ask whether high amounts of pay are desirable and then we would be able to separate our two individuals mentioned above. But this solution leads to another problem. Once a point on the dimension (usually an optimal level) is selected, certain assumptions must be made. For example, is a low level of desirability for a high amount of an outcome (our man with a tax problem) the same as a high desirability for a low amount of an outcome? This linear assumption seems fairly logical, but it still is an assumption. The alternative is to measure the desirability of each level of the outcomes and the probability of the behavior leading to each level. We have already discussed the problems with this approach.

## II. Measurement

Two minor points about the measurement of the valence of the outcomes are in order. First, it should be emphasized that we want to know the valence of the outcome to the subject personally, not how other people in general evaluate the outcome. The theory deals with individual motivation.

Second, the kind of scale used may make a difference in the way in which scores are combined or conceptualized. For example, Rosenberg (1965) let the valence dimension take on values from +10 to -10 while the instrumentality dimension went from +5 to -5. The way in which these scores are generated and combined influences the relative contribution of either component to the overall score. The theory predicts that they

make equal contributions.

### General Statements About the Theory

Two further problems appear once we have generated our outcomes, instrumentalities and valences, and combined them in the proper way. One issue deals with how we relate these scores to our criterion and the second refers to the correctness of our criterion.

#### I. Relationship to Criterion

After the data have been gathered, the total motivation score ( $\Sigma IV$ ) is typically correlated with some other measure (e.g., effort or choices over a number of trials, etc.). However, as mentioned before, the theory is meant to predict why a given person manifests one behavior rather than another, or why he exerts a certain amount of effort rather than some other amount. To do this requires that the investigator generate a  $\Sigma IV$  for each act or effort level (artificially imposed) for each individual. The analysis of the data would involve predicting for each subject the alternative with the highest  $\Sigma IV$ .

The usual way of testing the theory in the organizational area, however, is to look across people rather than within. More specifically, we say that if one individual exerts more effort than another, then the  $\Sigma IV$  for the first individual should be higher. This  $\Sigma IV$  reflects the degree to which, for example, "working extremely hard" will lead to a set of outcomes (e.g., good performance) and the evaluation of the outcomes. It does not necessarily reflect the  $\Sigma IV$  of the degree of effort he has chosen to exert nor does it give any comparison with the  $\Sigma IV$ 's of other effort levels. We have already discussed the linear assumptions on

which this  $\Sigma IV$  is based. A second problem with this procedure is that response sets within individuals will influence our prediction across people. More specifically, a valence of 5 (on a seven point scale) might reflect a valence of 6 for someone else. Even though two individuals have the same feelings of attraction toward an outcome, the response set would lead to differential predictions. This problem is not as important when predicting which alternative will be selected from a set of alternatives by a given individual because presumably the response set will be reflected in all of the  $\Sigma IV$ 's generated for each alternative. One possible suggestion is the standardization of each individual's responses before the actual correlation with the criterion is performed. This technique has typically been ignored.

## II. The "Right" Criterion

A final problem that should be discussed is just what the theory is good at predicting. Circumstances that cannot be controlled or predicted will often influence behavior. One might predict, for example, that a subordinate may intend to see his boss to ask for a raise but his boss must also be willing to see him. A subject might intend to be "trusting" in the prisoner's dilemma game, but not be so when he encounters an "untrustworthy" partner. One's behavior is frequently dependent upon the behavior of others. The more the behavior is dependent upon the behavior of others, the less accurate will be the prediction. What the theory really predicts is the subjects intention to do something (see Dulany, 1967; Fishbein, 1967). A separate measure of intention should help to guide the experimenter in examining the relationship between the theory and the behavioral predictions.

A related problem is the time lag between the assessment of the theoretical components and the criterion observation. Both instrumentalities and valences change over time. In certain laboratory settings where these changes may be minimized the correlations between the total ( $\Sigma IV$ ) score and behavior can be very high (see Dulany, Schwartz and Walker, 1965). However, in the organizational setting there is less control and the correlations are typically lower. It is hard to say what part of this relative lack of success can be attributable to the time lag problem. However, in some situations the probabilities and valences do change rapidly and will consequently lower the correlations. The problem here is not with the validity of the theory but with its utility. The theory should not be rejected for the wrong reasons.

#### Summary

We have examined a number of theoretical and methodological problems with the organizational application of the idea that man's behavior is a function of how instrumental the behavior is for obtaining some outcomes and his evaluation of these outcomes. Some general points which perhaps bear repeating are listed below:

1. The theory's predictions are based on an individual's perceived outcomes. Using a list of outcomes constructed by the investigator includes assumptions that should be tested further.
2. Theoretically, the instrumentality idea demands that each level of each act be paired with each level of each outcome. Use of strategies that incorporate linear assumptions about this relationship have not been empirically justified.

3. Both instrumentalities and outcomes should be measured from the subjects' personal points of view.

4. When predicting across subjects, one should standardize scores within subjects.

5. Measures of intention should be obtained as well as actual behavioral criteria.

Many psychologists clearly believe that this theory can make a valuable contribution to our understanding of human behavior. Hopefully, the points mentioned above will help to determine the generality and the utility of the theory.

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## Footnotes

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- <sup>2</sup>Recent theories such as those presented by Graen (1969), Dulany (1967), Fishbein (1967) and Campbell, Dunnette, Lawler and Weick (1971) have modified the theory by adding or combining new variables into the equation. However, these additions do not change markedly the problems which will be discussed.
- <sup>3</sup>In this specific case Graen conceptualized "improving performance" and "really work hard" as discrete points and asked for a probability estimate between the two. However, it would have been possible to assess the relationship between increments in effort and increments or decrements in performance which would have been a correlational question.
- <sup>4</sup>It should be made clear that these authors were measuring instrumentalities which are defined as conceptually different from expectancy (Vroom, 1964). More specifically, expectancy refers to the probability of an act leading to a discrete outcome whereas instrumentality refers to the relationship between two continuous outcomes. Performance is viewed as an outcome as is promotion so in this case a correlational question is appropriate. This distinction is also present in the model presented in Figure 1.